INTERNATIONAL

ASSOCIATION FOR TESTING MATERIALS.

AMERICAN SECTION.

BULLETIN NO. 24. JUNE, 1901.

REVISED STANDARD SPECIFICATIONS

FOR

WROUGHT IRON.

RECOMMENDED BY AMERICAN BRANCH OF COMMITTEE NO. 1, TO REPLACE THOSE IN BULLETIN NO. 17. TO BE DISCUSSED AT THE ANNUAL MEETING AT NIAGARA FALLS, N. Y., JUNE 29, 1901.

PROCESS OF MANUFACTURE.

1. Wrought iron shall be made by the puddling process or rolled from fagots or piles made from wrought iron scrap, alone or with muck bar added.

PHYSICAL PROPERTIES.

2. The minimum physical qualities required in the four classes of wrought iron shall be as follows:

Tensile Test.

	Stay-bolt iron.	Merchant iron. Grade "A."	Merchant iron. Grade "B."	Merchant iron. Grade "C."
Tensile strength, pounds per sq. inch.....	46,000	50,000	48,000	48,000
Yield point, pounds per sq. inch.....	25,000	25,000	25,000	25,000
Elongation, per cent. in 8 inches.....	28	25	20	20

3. In sections weighing less than 0.654 pound per lineal foot, the percentage of elongation required in the four classes specified in paragraph No. 2 shall be 12 per cent., 15 per cent., 18 per per cent., and 21 per cent., respectively.

Nicking Test.

4. The four classes of iron when nicked and tested as described in paragraph No. 9 shall show the following fracture:

(*a*) Stay-bolt iron, a long, clean, silky fiber, free from slag or dirt, and wholly fibrous, being practically free from crystalline spots.

(*b*) Merchant iron, Grade "A," a long, clean, silky fiber, free from slag or dirt or any coarse crystalline spots. A few fine crystalline spots may be tolerated, provided they do not in the aggregate exceed 10 per cent. of the sectional area of the bar.

(*c*) Merchant iron, Grade "B," a generally fibrous fracture, free from coarse crystalline spots. Not over 10 per cent. of the fractured surface shall be granular.

(*d*) Merchant iron, Grade "C," a generally fibrous fracture, free from coarse crystalline spots. Not over 15 per cent. of the fractured surface shall be granular.

Cold Bending Test.

5. The four classes of iron, when tested as described in paragraph No. 10, shall conform to the following bending tests:

(*e*) Stay-bolt iron, a piece of stay-bolt iron about 24 inches long shall bend in the middle through 180° flat on itself, and then bend in the middle through 180° flat on itself in a plane at a right angle to the former direction, without a fracture on outside of the bent portions. Another specimen with a thread cut over the entire length shall stand this double bending without showing deep cracks in the threads.

(*f*) Merchant iron, Grade "A," shall bend cold 180° flat on itself without fracture on outside of the bent portion.

(*g*) Merchant iron, Grade "B," shall bend cold 180° around a diameter equal to the thickness of the tested specimen, without fracture on outside of the bent portion.

(*h*) Merchant iron, Grade "C," shall bend cold 180° around a diameter equal to twice the thickness of the specimen tested, without fracture on outside of the bent portion.

3. In sections weighing less than 0.654 pound per linear foot, the percentage of elongation required in the four classes specified in paragraph No. 2 shall be 21 per cent., 18 per cent., 15 per cent., and 12 per cent., respectively.

Hot Bending Test.

6. The four classes of iron, when tested as described in paragraph No. 11, shall conform to the following hot bending tests:

(*i*) Stay-bolt iron, shall bend through 180° flat on itself, without showing cracks or flaws. A similar specimen heated to a yellow heat and suddenly quenched in water between 80° and 90° F. shall bend, without hammering on the bend, 180° flat on itself without showing cracks or flaws.

(*j*) Merchant iron, Grade "A," shall bend through 180° flat on itself, without showing cracks or flaws. A similar specimen heated to a yellow heat and suddenly quenched in water between 80° and 90° F. shall bend, without hammering on the bend, 180° flat on itself without showing cracks or flaws. A similar specimen heated to a bright red heat shall be split at the end and each part bent back through an angle of 180°. It will also be punched and expanded by drifts until a round hole is formed whose diameter is not less than nine-tenths of the diameter of the rod or width of the bar. Any extension of the original split or indications of fracture, cracks, or flaws developed by the above tests will be sufficient cause for the rejection of the lot represented by that rod or bar.

(*k*) Merchant iron, Grade "B," shall bend through 180° flat on itself, without showing cracks or flaws.

(*l*) Merchant iron, Grade "C," shall bend sharply to a right angle, without showing cracks or flaws.

Threading Test.

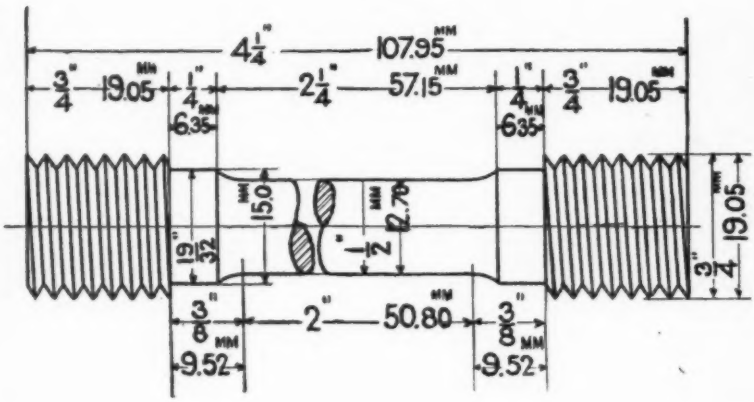
7. Stay-bolt iron shall permit of the cutting of a clean sharp thread and be rolled true to gauges desired, so as not to jam in the threading dies.

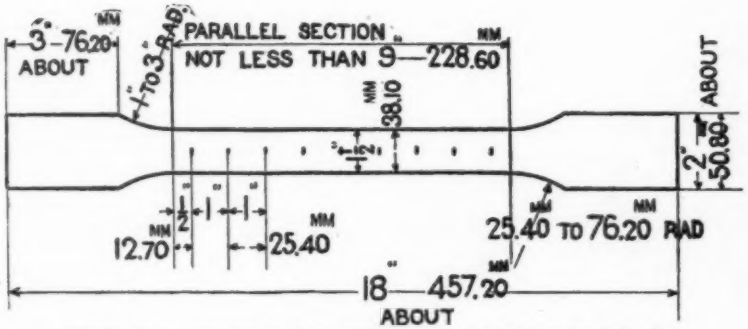
Test Pieces and Methods of Testing.

Test Specimen for Tensile Test.

8. Whenever possible, iron shall be tested in full size as rolled, to determine the physical qualities specified in paragraphs Nos. 2 and 3, the elongation being measured on an eight inch (8″) gauged length. In flats and shapes too large to test as rolled, the standard test specimen shall be one and one-half inches (1 1/2″) wide and eight inches (8″) gauged length.

In large rounds, the standard test specimen of two inches (2") gauged length shall be used ; the center of this specimen shall be half way between the center and outside of the round. Sketches of these two standard test specimens are as follows :





PIECE TO BE OF SAME THICKNESS AS THE PLATE.

9. Nicking tests shall be made on specimens cut from the iron as rolled. The specimen shall be slightly and evenly nicked on one side and bent back at this point through an angle of 180° by a succession of light blows.

Nicking Tests.

10. Cold bending tests shall be made on specimens cut from the bar as rolled. The specimen shall be bent through an angle of 180° by pressure or by a succession of light blows.

Cold Bending Tests.

11. Hot bending tests shall be made on specimens cut from the bar as rolled. The specimens, heated to a bright red heat, shall be bent through an angle of 180° by pressure or by a succession of light blows and without hammering directly on the bend.

Hot Bending Tests.

If desired, a similar bar of any of the four classes of iron shall be worked and welded in the ordinary manner without showing signs of red shortness.

12. The yield point specified in paragraph No. 2 shall be determined by the careful observation of the drop of the beam or halt in the gauge of the testing machine.

Yield Point.

FINISH.

13. All wrought iron must be practically straight, smooth, free from cinder spots or injurious flaws, buckles, blisters or cracks.

In round iron, sizes must conform to the Standard Limit gauge as adopted by the Master Car Builders' Association in November, 1883.

INSPECTION.

14. Inspectors representing the purchasers, shall have all reasonable facilities afforded them by the manufacturer to satisfy them that the finished material is furnished in accordance with these specifications. All tests and inspections shall be made at the place of manufacture, prior to shipment.